UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/875,310	06/06/2001	Toshiyuki Miyauchi	450100-03277	7066

20999 7590 10/28/2003

FROMMER LAWRENCE & HAUG
745 FIFTH AVENUE- 10TH FL.
NEW YORK, NY 10151

EXAMINER	
TORRES, JOSEPH D	
ART UNIT	**PAPER NUMBER**
2133	6

DATE MAILED: 10/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/875,310	MIYAUCHI, TOSHIYUKI	
	Examiner	Art Unit	
	Joseph D. Torres	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. **The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided**. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

1. The abstract of the disclosure is objected to because 1) the abstract exceeds 150 words, 2) the abstract uses form and legal phraseology and 3) the abstract uses references to the drawings. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the log likelihood" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 1 recites the limitation "the received value" in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 1 recites the limitation "the probability" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 1 recites the limitation "the input" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claims 2-15 depend from claim 1, hence inherit the deficiencies of claim 1.

Claim 16 cites similar language as in claim 1.

Claims 17-30 depend from claim 16, hence inherit the deficiencies of claim 16.

Claim 3 recites the limitation "the bits" in line 2. There is insufficient antecedent basis for this limitation in the claim. Note: use of "the bits" gives the impression that the bits in claim 3 are the same bits as in claim 2. The Examiner recommends deleting "the".

Claim 18 cites similar language as in claim 3.

Claim 10 recites the limitation "the code output pattern" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites the limitation "the coding starting state" in line 7. There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites the limitation "the coding terminating state" in line 10. There is insufficient antecedent basis for this limitation in the claim.

Claim 25 cites similar language as in claim 10.

Claim 11 recites the limitation "the log soft-output" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 13 recites the limitation "the multiplications for computing the probability by logarithmic additions" in lines 2 and 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 13 recites the limitation "the additions for computing the probability by logarithmic maximum value computations" in lines 3 and 4. There is insufficient antecedent basis for this limitation in the claim.

Claim 28 cites similar language as in claim 13.

The Examiner would like to point out that claims 1-30 of the current application are replete with 35 U.S.C. 112, second paragraph problems. The claims should be thoroughly revised so as to remove all 35 U.S.C. 112 problems.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1, 4, 5, 7-16 19, 20 and 22-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benedetto et al. (S. Benedetto, D. Divsalar, G. Montorsi, and F. Pollara, Soft-Output Decoding Algorithms in Iterative Decoding of Turbo Codes, TDA Progress Report 42-124, NASA Code 315-91-20-20-53) in view of XP-000888685 ("Simplified Log-Map Algorithm", Research Disclosure, Kenneth Mason Publications, Hampshire, GB, No. 421, May 1999, Page 612, ISSN: 0374-4353).

35 U.S.C. 103(a) rejection of claims 1 and 16.

Benedetto et al. (hereafter referred to as Benedetto) teach a decoder for determining the log likelihood logarithmically expressing the probability of passing a given state on the basis of the received value regarded as soft-input and decoding the input by using the log likelihood (the Abstract, Appendix and Figures 6, A-1 and a-2 in Benedetto teach a decoder for determining the log likelihood logarithmically expressing the probability of passing a given state on the basis of the received value regarded as soft-input and

decoding the input by using the log likelihood), said decoder comprising: a linear approximation means for calculating a correction term to be added to the log likelihood (Approximation 1 on page 86 of Benedetto teaches a linear approximation means, -ax+b, for calculating a correction term to be added to the log likelihood), the correction term being expressed in a one-dimensional function relative to a variable (in Approximation 1 on page 86 of Benedetto, -ax+b is a one-dimensional function relative to the variable x); and said linear approximation means being adapted to compute said correction term using a coefficient representing the gradient of said function for multiplying said variable (see Approximation 1 on page 86 of Benedetto; Note: a represents the one-dimensional gradient of the function, -ax+b).

However Benedetto, does not explicitly teach the specific use of the coefficient being expressed as a power exponent of 2.

Document XP-000888685, in an analogous art, teaches that $B = 4 = 2^2$, hence a in Benedetto $=2^{-2}$ since a in Benedetto = 1/B. Document XP-000888685 provides explicit motivation for combining stating that "...B = 4 achieves performance that is very close to exact implementation".

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Benedetto with the teachings of Document XP-000888685 by including use of the coefficient being expressed as a power exponent of 2. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of the coefficient being expressed as a power exponent of 2 would

have provided the opportunity to achieve performance that is very close to exact implementation (see the last paragraph of the first page of Document XP-000888685).

35 U.S.C. 103(a) rejection of claims 4, 5, 19 and 20.

Selection of a particular value for b in the equation, -ax+b, is a particular embodiment of the equation, hence does not deviate from the scope or intent of the teachings in the Benedetto paper.

35 U.S.C. 103(a) rejection of claims 7 and 22.

$|x-y|$ in the equation $A - (|x-y|/B)$ of Document XP-000888685 is a positive value, hence Document XP-000888685 teaches said correction term shows a positive value. Note also, this is consistent with the Benedetto paper since the Benedetto paper requires $x > 0$.

35 U.S.C. 103(a) rejection of claims 8 and 23.

Document XP-000888685 teaches $(A - (|x-y|/B))_+ = A - (|x-y|/B)$ when $A - (|x-y|/B) > 0$ and $(A - (|x-y|/B))_+ = 0$ when $A - (|x-y|/B) \leq 0$.

35 U.S.C. 103(a) rejection of claims 9 and 24.

The log-BCJR MAP algorithm is based on the natural logarithm (see Approximation 1 on page 86 of Benedetto).

35 U.S.C. 103(a) rejection of claims 10, 11, 25 and 26.

Benedetto teaches a first probability computing means for computing for each received value a first log likelihood logarithmically expressing a first probability determined by the code output pattern and said received value (log-BCJR 1 Decoder in Figure 6 on page 79 of Benedetto is a first probability computing means for computing for each received value a first log likelihood logarithmically expressing a first probability determined by the code output pattern and said received value); a second probability computing means for computing for each received value a second log likelihood logarithmically expressing a second probability of getting to each state from the coding starting state in the time series (log-BCJR 2 Decoder in Figure 6 on page 79 of Benedetto is a second probability computing means for computing for each received value a second log likelihood logarithmically expressing a second probability of getting to each state from the coding starting state in the time series); a third probability computing means for computing for each received value a third log likelihood logarithmically expressing a third probability of getting to each state from the coding terminating state in the inverted time series (log-BCJR 3 Decoder in Figure 6 on page 79 of Benedetto is a third probability computing means for computing for each received value a third log likelihood logarithmically expressing a third probability of getting to each state from the coding terminating state in the inverted time series); and said second probability computing means and said third probability computing means having the linear approximation means (see Approximation 1 on page 86 of Benedetto).

35 U.S.C. 103(a) rejection of claims 12 and 27.

The log-BCJR MAP algorithm is based on the natural logarithm (see Approximation 1 on page 86 of Benedetto).

35 U.S.C. 103(a) rejection of claims 13 and 28.

The equation, -ax+b, on page 86 of Benedetto is a computation means for replacing the multiplications for computing the probability by logarithmic additions and the additions for computing the probability by logarithmic maximum value computations and computations of said function.

35 U.S.C. 103(a) rejection of claims 14 and 29.

The maximum a posteriori probability decoding operation in Benedetto is conducted on the basis of the Log-BCJR algorithm (see Approximation 1 on page 86 of Benedetto).

35 U.S.C. 103(a) rejection of claims 15 and 30.

Figure 1 on page 64 of Benedetto teaches convolutional codes.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Dinc, Abdulkadir et al. (US 6393076 B1) teaches maximum a posteriori type decoders (log-MAP, MAP, max-log-MAP, constant-log-MAP, etc.) utilizing forward and backward generalized Viterbi recursions or soft output Viterbi

algorithms (SOVA) on the trellis in order to provide soft outputs at each section. Benedetto et al. (S. Benedetto, D. Divsalar, G. Montorsi, and F. Pollara, A Soft-Input Soft-Output Maximum A Posteriori (MAP) Module to Decode Parallel and Serial Concatenated Codes, TDA Progress Report 42-127, NASA Code 315-91-20-20-53). Robertson et al. (Robertson, P.; Villebrun, E.; Hoeher, P.; A comparison of optimal and sub-optimal MAP decoding algorithms operating in the log domain, IEEE International Conference on Communications, Volume: 2, 18-22 June 1995, Page(s): 1009 –1013). Hsu et al. (Jah-Ming Hsu; Chin-Liang Wang; On finite-precision implementation of a decoder for turbo codes; Proceedings of the 1999 IEEE International Symposium on Circuits and Systems, Volume: 4 , 30 May-2 June 1999, Page(s): 423 –426)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (703) 308-7066. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (703) 305-9595. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-746-7240.

Joseph D. Torres, PhD
Art Unit 2133